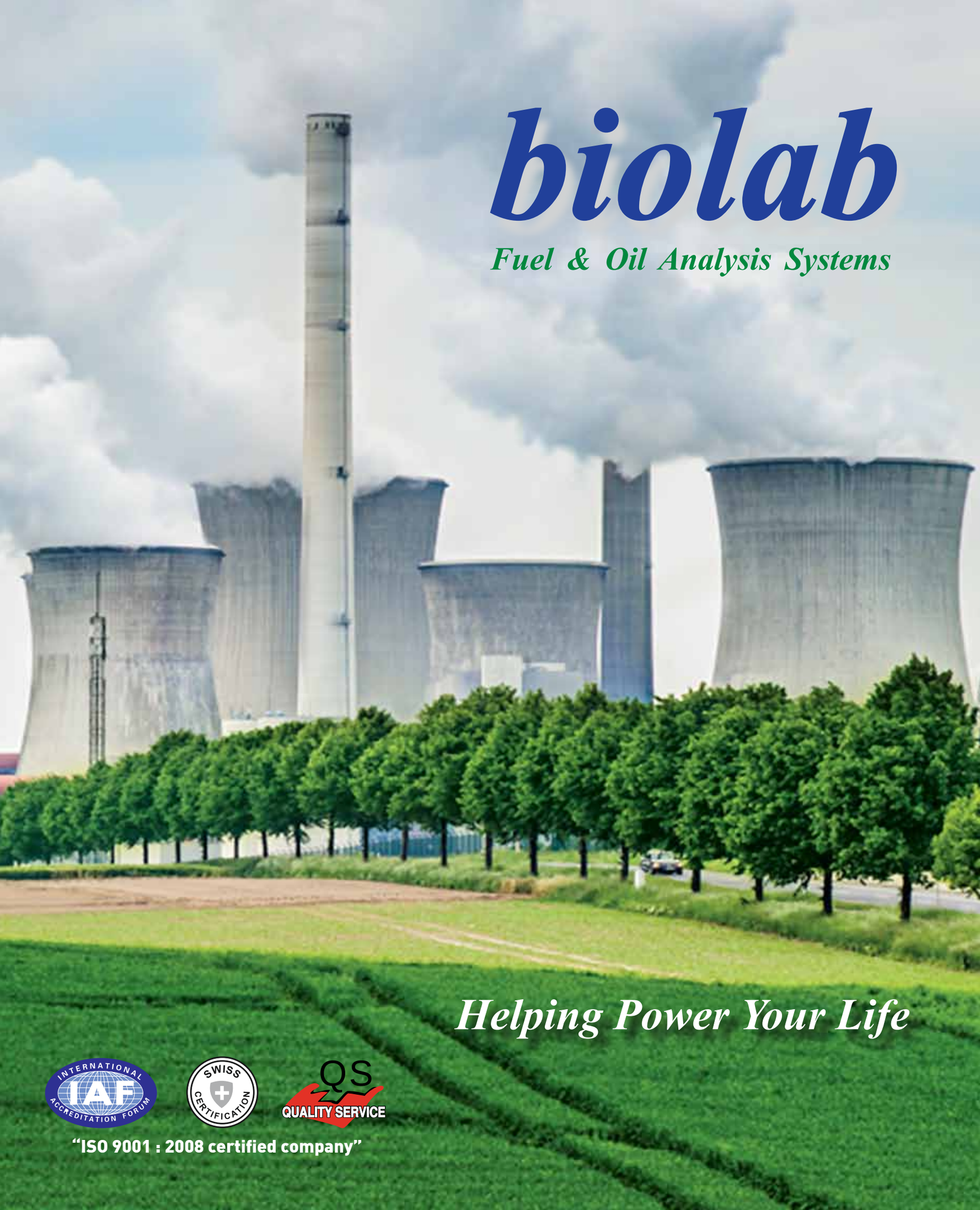

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Fuel & Oil Analysis Systems

Helping Power Your Life

"ISO 9001 : 2008 certified company"

NORIA
LICENSED PARTNER

"ISO 9001:2008 certified company"

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biolab established in 1987 as a leading supplier and manufacturer of high quality laboratory equipments.

biolab is built on a lifetime's experience in the field which gives high priority to technical expertise and customer support for all products that we distribute.

biolab is an ISO 9001:2008 certified company and got awarded the Technology Reward by TUBITAK (The Scientific and Technological Research Council of Turkey) and TUSIAD (Turkish Industry and Business Association) in 2007.

biolab is creating solutions for engineering needs and it is a leading supplier in the field of Fuels and Oils laboratory instruments including; Fuel & Oil Analysis Spectrometers, Oil Condition Monitoring Systems, Particle Counting & Imaging, Viscometers & Capillaries, Turn-Key Fuel & Oil Labs, Predictive Maintenance Labs, Turn-Key Mobile Fuel & Oil Labs, Gasoline & Diesel Analysing Systems, Vapor Pressure Testing Systems, Flash Point Testers, Distillation Instruments, Sulfur & Lead, Color, Water Content, TAN/TBN Analyzers, Cloud & Pour, CFPP, Freeze Point, Oxidation, Corrosion, Rust, FIA & Foam Testing Instruments, On-Site Environmental Fuel & Oil Testing Kits, FTIR Infrared Spectrometers.

biolab main business partners are as follows:

- Oil companies and all related industries and sub divisions including Refineries, Distribution, Gas Companies, Lube Oil and Pipe Lines.
- Electrical Power Generation Plants
- Private Oil Companies.
- Third Party Certification Labs.
- Universities, Institutes and their related departments.
- Militaries and government base companies.
- Transportation Companies
- Construction Companies

biolab provides full warranty, technical service and support for all instruments before and after sales, supported through highly qualified technical engineers who follows directly the customer technical demands locally at site.

biolab is following its activities in the area including Middle East, North Africa and Mid-Asia countries.

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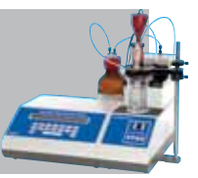
Table of Contents

04 Spectroil MFCynan Fuel & Oil Analysis Spectrometer

08 UT – flow Viscosity System

10 Automatic Density Meter

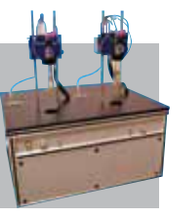
14 Coulometric KF Water Content Analyzer



16 Titra – All Titration System

18 Flash Point Tester

20 Total Sulfur Analyzer



22 Cloud & Pour Point & CFPP Tester

23 Particle Counter & Shape Classifier

26 FTIR Oil Analyzer

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Fuel & Oil Analysis Spectrometer

Spectroil MFCynan

Features

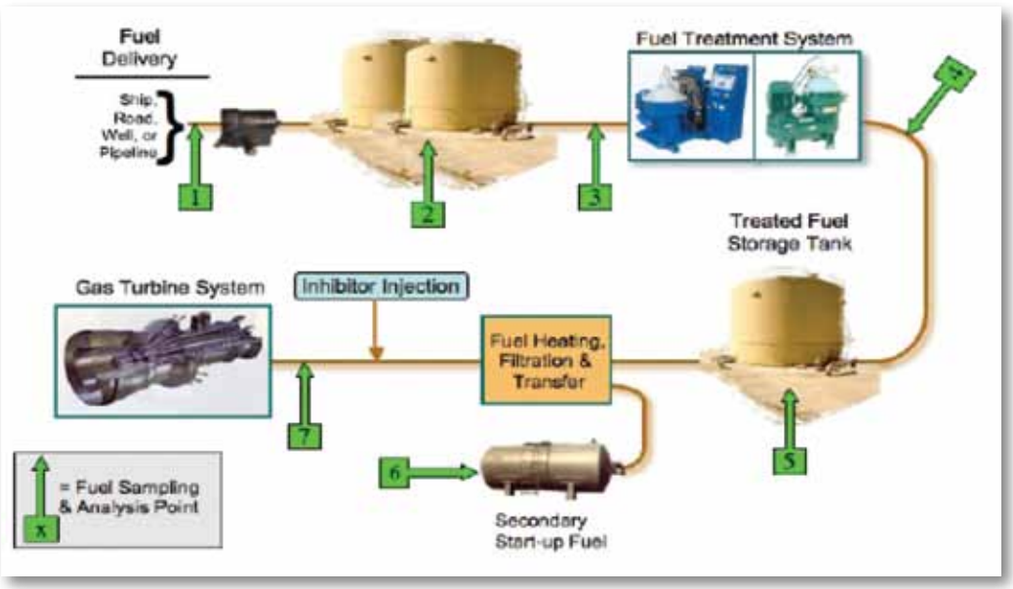
- Conforms to ASTM D6728 Standard Test Method for Fuels and ASTM D6595 for Oils.
- Bench-top and transportable
- No sample preparation for typical fuels and oils
- Simple to operate without special training or background
- Standard and readily available consumables
- Analyzes up to 32 elements simultaneously
- Requires no special utilities or gases, only AC power
- Always ready to analyze samples
- Optional turbine cleaning water and injection water analysis
- Capable of analyzing naptha or highly volatile fuels with a sample preparation kit
- Optional large particle analysis capability
- Meets stringent Department of Defense requirements (JOAP)
- Windows® Operating System

Typical Applications

- Fuel quality analysis for liquid fired gas turbines and diesel engines at:
  - Electrical Power Generation Plants
  - Fuel treatment systems
  - Shipboard propulsion systems
- Qualification of fuel treatment system effectiveness
- Commercial Laboratories
- Oil Companies
- Railroads, Airlines, Public Transportation Companies,
- Marine Fleets
- Mines
- Refineries
- Construction Equipment Dealers
- Chemical Processors
- Steel Mills
- Manufacturing Plants
- Military
- Formula 1 Racing Teams

Fuel Analysis

During the last 30 years, gas turbines have been modified so they may be fueled by all types of liquid fuels, from distillates to residual and crude oil. Ash-forming contaminants often present in various fuels lead to corrosion and deposit problems. Ash-forming materials may be in a fuel as oil soluble organo-metallic compounds, as water soluble salts or as solid foreign contamination. Their presence and concentration vary with the geographical source of a crude oil. They are concentrated in the residual fractions during the refining process. Even distillates, which are typically contaminant free when they leave the refinery, may have ash-forming materials introduced later in the form of salt water or by inadvertent mixture with other petroleum products during transportation or storage. If crude oils are fired directly without refining, they usually require desalting, especially if sea transport was used.



Above is a typical example of a residual fuel storage, treatment, and handling system.

The Spectroil MFCynan has become the standard instrument when on-site and immediate fuel analysis is a necessity. It fulfills the requirements of ASTM D 6728, Standard Test Method for Determination of Contaminants in Gas Turbine and Diesel Engine Fuel by Rotating Disc Electrode Atomic Emission Spectrometry. The Spectroil MFCynan is a compact, rugged and easy to use spectrometer designed specifically for the analysis of fuel and oil samples. It measures trace quantities of dissolved or suspended contaminant particles in a fuel sample using the time-tested and reliable Rotating Disc Electrode (RDE) technique. When a fuel arrives on site, it has gone through production, storage, transport and again storage. Few fuels are so clean after this cycle that they can be used without treatment. Analysis requirements start with delivery of the fuel, continue through out fuel handling, and end only as the fuel is injected into the turbine

Fuel & Oil Analysis Spectrometer
Spectroil MFCynan

Preconditioning of the fuel before it reaches the gas turbine is pre-requisite for installations when contamination may be present. Spectrometric analysis determines the amount of treatment required and the efficiency of that treatment. In particular, sodium and potassium concentrations must be determined to well below 1 part-per-million (ppm) in most fuels.

In heavy fuels, the vanadium concentration is used to calculate the amount of magnesium treatment compound to be added to the fuel. A typical analysis of a fuel sample consists of a minimum of 13 elements to include other contaminants such as iron, lead, zinc, aluminum, silicon, etc. Diesel engines are also detrimentally effected by trace contaminants. In several instances, ships at sea have become immobilized by engine failure due to distillate fuel contaminated with catalytic cracking fines. These are extremely abrasive alumina and silica particles readily detected spectrometrically by the presence of Al and Si.

The Spectroil MFCynan is calibrated for accurate analysis of contaminants and additives in gas turbine and diesel fuels, regardless of their origin or characteristics. The fuels can vary from No. 2 distillates to No. 6 residual fuels as well as crude oil. Even highly volatile fuels, such as naphthas or gasoline, can be analyzed after sample preparation. A sulfur analysis capability is also available as an option. The on-site analysis capability and ease of operation of the Spectroil MFCynan make it the ideal instrument for this application.

Advantages of Fuel & Oil Analysis

- Fast and simultaneous analysis of all key metals in fuel and oil samples.
- Only 30 second “burn” measures all the sub-ppm levels of metals.
- Capable of analyzing fuels from distillates to heavy residuals and lubricating oils.
- Continuously available for immediate analysis of fuel and oil samples.

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Oil Analysis Consumables

Sulfur Accessory for
Oil and Fuel

Oil Analysis

The Spectroil MFCynan is a compact, rugged, transportable and easy to use spectrometer designed specifically for the analysis of oil samples. It measures trace quantities of elements dissolved or suspended as fine particles in natural or synthetic petroleum based products using the time tested and reliable Rotating Disc Electrode (RDE) technique.

The Spectroil MFCynan has the capability to analyze all the wear metals, contaminants and additives typically found in used oil samples. The Spectroil MFCynan was designed specifically for the analysis of used oil and is equally at home in the laboratory or on-site where immediate oil analysis results can be vital and sample turnaround time is crucial.

The Spectroil MFCynan has become the standard instrument at most commercial oil analysis laboratories and machine condition monitoring programs that require the rapid analysis of wear metals, contaminants and additives in lubricants. It fulfills the requirements of ASTM D6595 Standard Method for Determination of Wear Metals and Contaminants in Used Lubricating Oils or Hydraulic Fluids by Rotating Disc Electrode Atomic Emission Spectrometry.

The Spectroil MFCynan continues to be the ideal used oil analysis spectrometer for commercial applications because technology has made it smaller, faster, more stable, more accurate and easier to operate with new capabilities and enhanced performance. Optional accessories include the D^2R^2 (Double Disc Rapid Robot) robotic system for automatic and unattended operation and the A-RFS (Rotrode Filter Spectroscopy) system for the analysis of large particles. Additional capabilities to analyze engine coolants and sulfur in oil are also available as options. Other versions of the Spectroil include the Spectroil M/N-W for military used oil analysis.

Predictive Maintenance by Used Oil Analysis

Spectrometric Oil Analysis is applicable to any closed loop lubricating system, such as those found in diesel and gasoline engines, gas turbines, transmissions, gear boxes, compressors and hydraulic systems.

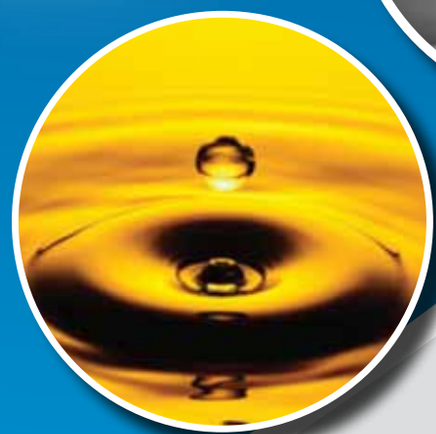
In practice, one takes an oil sample from a system. The spectrometer analyzes the sample for trace levels of metal worn from moving parts, as well as for extraneous contamination and additive element levels.

The resulting data, when compared to previous analyses and allowable limits, may indicate a sound mechanism showing only normal wear or it may point out a potentially serious problem in its early stages. With this advance warning, steps may be taken to correct the situation before serious damage or injury occurs.

Viscosity Measurement
UT-flow

Fast & Reliable Results

- Very easy to use
- Highly reliable and repeatable measuring results
- Short measuring times
- Quick bath and sample warm-up
- Very low sample quantities (0.3-0.8 ml)
- Semi-automated cleaning and drying
- Easily exchangeable viscometers
- Integrated system design eliminates the need for a seperate thermostatic bath
- Savings up to 90% on cleaning & drying solvents
- Exceptional bath temperature stability
- Viscometers can be independently cleaned
- Compliant with or exceeding requirements in ASTM D445, D446, D7279 and related specifications for kinematic viscosity testing



TECHNICAL SPECIFICATIONS

Standard methods	:	ASTM D445, D446, D7279
Temperature range	:	Ambient to 150° C & below ambient external cooler
Temperature stability	:	20 - 100° C ± 0.01° C, > 100° C ± 0.03° C
Bath volume	:	7.5 liter
Viscometers	:	Four UT - flow tubes
Dimensions (l x w x h)	:	455 x 230 x 620 mm.
Weight	:	23 kg (empty)

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Unique Viscometer Design

The shape and dimensions of the UT-flow viscometers have been designed in such a way that disturbance of the laminary flow area by turbulence is virtually non-existent. Measuring kinematic viscosity of both transparent and opaque fluids (Newtonic) with this type of viscometer meets or exceeds the requirements in relevant international standards, such as ASTM, IP, ISO, NEN, DIN etc. The UT-flow viscometer was designed for flow times of 30 seconds and higher and viscosities of 1-3,000 mm^2/s. UT-flow types for longer flow times and higher viscosity ranges can be supplied as well.

Product Origins

The UT-flow viscometer was designed as a high-speed-low-cost alternative for commonly used viscometer types which eliminates all the below disadvantages such as:

The long measuring cycles. The difficulty to clean or dry the viscometer completely large quantities of both sample and cleaning & drying solvents are required. Because of the small volume of the viscometer much smaller quantities of both sample and cleaning & drying solvents are required without removing the viscometer from the bath which saves considerably on measurement costs, guarantees complete cleaning and drying and allows for quick sample warm-up. Up to 90% savings on cleaning/drying solvents compared to conventional viscometers.

System Integration

The UT-flow is an integrated, compact system that requires little working space. The thermostatic bath, that offers extraordinary temperature stability can house up to 4 viscometers; therefore in principle 4 simultaneous measurements can be performed. Because of the relatively small volume of the bath it can be brought to temperature very quickly.

The viscometers are ergonomically integrated in the system which allows for easy removal, thereby reducing the risk of fracture considerably. Also, the bath does not need to be drained in order to replace a tube. For daily usage-such as measuring, cleaning and drying-the viscometers do not have to be removed from the bath. An illuminated screen behind the viscometers allows for easy reading of the meniscus of the sample. After the measurement has taken place the viscometers can be seperately and independently cleaned and dried. This makes it possible to only clean one tube without interfering with the measurements in other viscometers. Cleaning and drying is done by injecting a suitable solvent into the viscometer. The integrated pump subsequently evacuates the tube and pulls the liquids to an external collection vessel.

For measurements that have to take place at or below room temperature, an additional cooling spiral has been provided inside the thermostatic bath, to which an external oil or water cooler can be attached.

For more details on Viscosity Analysis, please ask for detailed brochure.

Density

Areas of Applications

Density Meter with high precision Peltier temperature control of sample, has the features to meet the needs of today's industries.

PETROLEUM

- Measure API Values in accordance with ASTM D1250, ASTM D4052, ASTM D5002 and DIN 51757
- QC incoming raw materials
- Research new products and additives
- Withstands harsh and heavy use environments
- Calibrate using petroleum standards

CHEMICAL

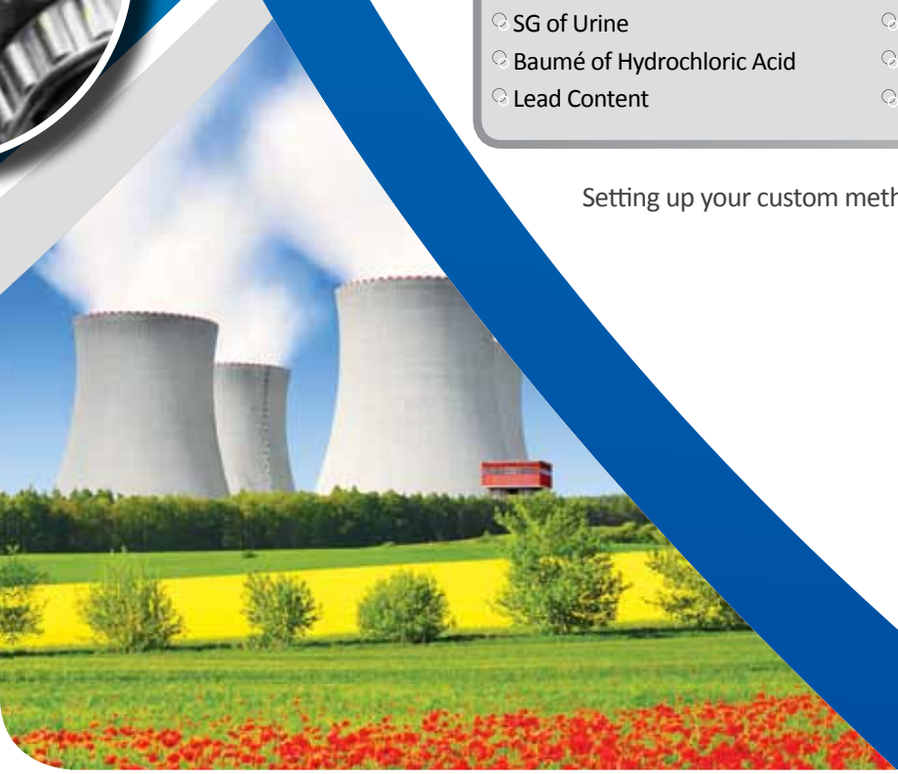
- Measure in units of Kg/m^3, g/cm^3, g/ml, pounds/gallon, specific gravity, Baumé and more
- Determine concentrations in: %, molarity, normality, mole fraction, ppm, and more
- Check batch consistency and ensure proper blending ratios
- Wetted materials compatible with the most aggressive chemicals

PHARMACEUTICAL

- Capable of 2,3,4 or more multiple measurements with standard deviation, mean, min and max reading for true cGLP/GMP compliance
- Complete IQ/OQ/PQ documentation
  Checking of raw materials and product release
- 21CFR11 Compliance; Electronic
  Signature and Secure Data Storage
- Compliant with USP 29<841>, JP, BP and EP

BEVERAGE

- Measure both alcoholic and non-alcoholic beverages with easy bubble detection using VideoView™
- Direct and accurate means of °Brix determination, °Plato, °Balling, % Solids
- Use apparent density function for proper filling volume monitoring



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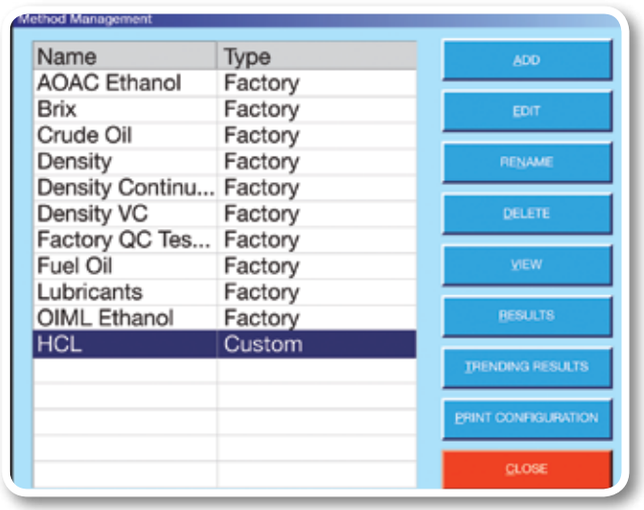
Flexible Method Management

Factory installed measurement methods allow for immediate selection of the correct method to match the most common applications.



For unique measurement applications, create a sample method using an unlimited number of Concentration Tables, Formulas, and Polynomials to match the measurement methods used in your laboratory. A few customized sample methods shown below:

- Concentration D_2O-Heavy Water
- % HNO_3
- Mole Fraction of Methanol
- SG of Urine
- Baumé of Hydrochloric Acid
- Lead Content
- Normality of Sulfuric Acid
- Sweeteners
- Monomer Solutions
- Fat in Lubricant
- Density of Gasses and Aerosols
- ppm Gold in Acid
- Potassium Permanganate
- Hydrogen Peroxide
- Drug to Propellant Ratio
- Sodium Hydroxide
- Molar Solutions of EDTA
- % Toluene in Heptane

Setting up your custom method is as simple as filling out a few screens like the one below.

Density

TECHNICAL SPECIFICATIONS

Measurement Ranges	:	Density : 0 to 3 g/cm³ Temperature : 0 °C to 90 °C (controlled via Peltier) Pressure : 0 to 10 bars
Measurement Modes	:	Continuous, Single, Multiple
Measurement Technique	:	Mechanical Oscillator Method
Accuracy	:	Density : 0.00005 g/cm³ Temperature : 0.03 °C
Repeatability	:	Density : 0.00001 g/cm³ Temperature : 0.01 °C
Resolution	:	Density : 0.00001 g/cm³ Temperature : 0.01 °C
Minimum Sample Volume	:	Less than 1ml
Wetted Materials	:	Borosilicate glass, Teflon (PTFE, ECTFE)
Display	:	10.4 inch diagonal, 800-600 pixels, color, Flat Panel Monitor with Resistant Touch Screen Interface, 200 nits brightness, gasketted for spill protection
Communication Interface	:	Touch Screen User Interface 5-USB Ports 2-RS232 Ports Ethernet Port for Network Connection Keyboard, Bar Code Scanner, Mouse, Network Capabilities
Video & Magnification	:	Video assisted view of cell, capable of approximately 10X magnification
Internal Memory	:	8 GB Non-removable Compact Flash
Dimensions (L x W x H)	:	91.44 cm x 48.26 cm x 45.72 cm
Weight	:	31.75 kg
Power Supply	:	85 to 260 VAC; 48 to 62 Hz
Power Consumption	:	150 – 200 Watt

Oscillating U-Tube with Viscosity Correction and Reference Oscillator

The Density Meter's oscillating U-tube with full range viscosity correction and reference oscillator allows long term calibration stability and measurement at all temperatures with a single calibration.

Full Feature VideoView™ with Automatic Scanning of Entire U-Tube

VideoView™ provides superior high resolution visual bubble detection within your samples with live on screen video viewing. A full view of the entire U-tube is possible without any obstruction and provides a 10X magnification of bubbles if present in the sample. Automatic scanning of the entire length of the U-tube is possible as well as manually controlled viewing positions. The video clarity, magnification, and resolution is the very best available.

Full 21CFR Part 11 Instrument Level Compliance

The Density Meter's 21CFR Part 11 software module is easily enabled through the user friendly touch screen. This module gives you full compliance with:

- Write protected documents sent directly to server
- Electronic signature
- Access levels
- Internal write protected storage
- Unique passwords

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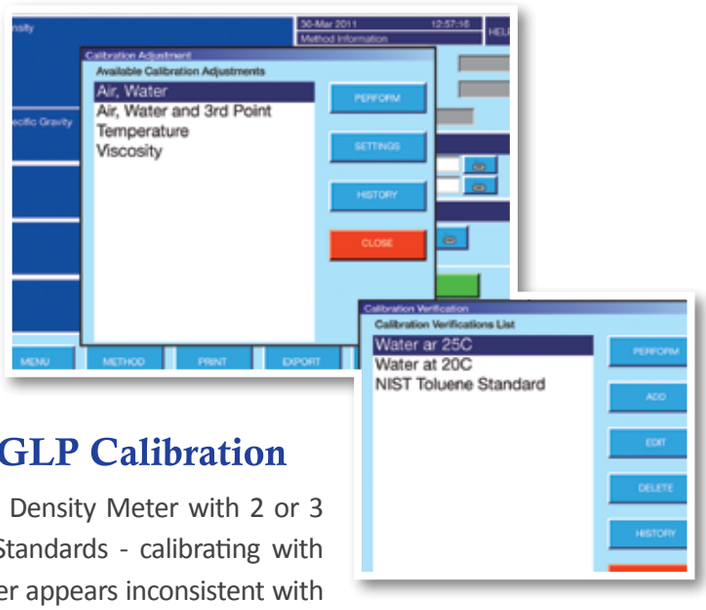
Automation Flexibility

- AutoSampler can be loaded with up to 240 samples
- Combine density and specific gravity measurements with a polarimeter, refractometer, and colorimeter for simultaneous measurements of:
  - Refractive Index
  - Color
  - pH
  - Optical Rotation/ Specific Rotation
- Up to three different rinse solvents available for use; fully programmable
- Two sample loading modes; pressurized and suction; for optimized sample transfer and measurement
- Customer's unique sample bottles may be use to eliminate the need to transfer samples into special sized test tubes.
- Emergency samples measured at any time without stopping the AutoSampler or moving sample vials.



cGMP/GLP Calibration

- Calibrate the Density Meter with 2 or 3 NIST Traceable Standards - calibrating with merely air and water appears inconsistent with cGMP/GLP compliance regulations.
- Can print out complete method configuration, communication settings, as well as calibration verification and calibration adjustment data/history.
- Measured values can be shown continuously as temperature stability is being reached or, at the discretion of the user, measured values will only be displayed once the final answer is reached and completely stable.
- Unlimited number of customized calibration adjustments and calibration verifications possible.
- Complete History of Calibration Adjustments and Verifications are available to View, Print, and/or Export
- Possible to set calendar reminders as to when Calibrations are due

Computer Windows Based Flexibility

- 8 gigabytes of internal memory allow almost unlimited capacity for saving measurement data. The Density Meter is network ready and data may also be saved directly to your server or to any directory desired.
- Internet access is possible directly from the Density Meter's touch screen. Disk Protection feature protects the operating system against malware infections in networked environments.
- Windows based navigation architecture is so intuitive that most operators will never read the manual. But should you wish to reference the manual, it is stored right on the Density Meter's internal memory.
- Copy methods, transfer concentration tables, download data, etc., via the USB ports on the front of unit.
- Five USB ports allow for quick and easy connection to a mouse, keyboard, printer, bar code scanner or memory stick.

Water Content Analysis
Coulometric KF

Areas of Applications

- Petroleum & All Petroleum Related Products
- Electrical Power Genaration Plants
- Contract Laboratories
- Lubricating Oil Industries
- Pharmaceuticals & Toiletries/ Cosmetics
- Industries
- Chemicals
- Automotive
- Aviation
- Universities
- Gases

TECHNICAL SPECIFICATIONS

Titration Method	:	Coulometric Karl Fischer titration
Electrolysis Control	:	Patented "ACE" control system GB2370641
End Point Detection	:	AC polarisation
End Point Indication	:	Visual display/print out/acoustic beep
Measuring Range	:	
Possible	:	1µg – 200 mg water.
Typical	:	1µg – 10mg water
Moisture Range	:	1ppm – 100% water
Max. Sensitivity	:	0.1µg
Max. Titration Speed	:	2.24 mg per minute
Max. Current	:	400 ma
Drift Compensation	:	Automatically controlled
Precision	:	10-100µg ± 3µg, 100µg-1mg ±3µg, above 1mg ±0.3%
Start Delay Time	:	0-30 minutes, user selectable
End Delay Time	:	0-30 minutes, user selectable
Calculation Modes (user programmable)	:	Weight/weight, (W/w) Weight/dilution ratio, (W/K) Volume/density, (V/SG) Volume/volume, (V/v)
Display Format	:	µg, mg/kg, ppm, %
Print Format	:	µg, mg/kg, ppm, %
Statistics	:	max, mean, min values up to 99 runs
Method Storage	:	10 user programmable methods
Sample ID Number	:	User programmable
Stirrer Speed	:	Microprocessor controlled
Languages	:	Multi languages-user selectable
Calendar / Clock	:	Analysis time & date print out
Battery Low Indicator	:	Display & print out indication
Data Outputs	:	USB and RS232 ports
Removable Data Storage	:	Flash drive (memory stick)
Data Entry	:	15 key touchpad
Display	:	40 character alphanumeric backlit LCD
Printer	:	42 character high speed thermal printer
Power Supply	:	90-264V AC, 47-63 Hz. 12V DC car adapter/internal battery
Dimensions	:	250 x 245 x 120 mm
Weight	:	3.5 kg

COU-LO SU KF

Cou-Lo SU KF moisture meters have been specifically designed for the determination of water content. Combining coulometry with the Karl Fischer method, Cou-Lo SU KF titrators determine the water content of samples by measuring the amount of electrolysis current necessary to produce the required iodine. This is an absolute technique which does not require the calibration of reagents.

Cou-Lo SU KF titrators have been developed in response to many suggestions and comments from our customers in routine laboratories, off-shore platforms and in the field. The built-in battery and optional carry case provide the versatility required by the laboratory and also the ease of use and portability required by the field engineer.

Cou-Lo SU KF offers many advantages over competition. Easy to use - simple to programme so that only a single button needs to be pressed for a titration, everything else is automatic. Complete with built-in high speed printer, everything in a single foot-print, small space requirement. Results can also be dowloaded via the Results Manager software package onto a PC spreadsheet.

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Features

- Simple operation
- 10 user programmable methods
- 1 ppm / 100 %
- Results in ppm, mg/kg, % & µg water
- Multi language display & print out
- Small footprint
- Integral high speed printer
- Fully portable
- Results Manager software
- Optional carry case
- Conforms to ASTM D 1533, D4928, D6304, IP386, IP438, API MPMS Chapter 10.9, IEC60814, ISO 10101-3, 10337 & 12937
- Low drift cell design with base drain tab for easy reagents changes
- Automatically compensated errors (patented technique)

GLASSWARE

The unique Low Drift Cell glassware design is by far the easiest to use and also the most robust. The electrode locking system allows the joints to seal completely, without the use of grease or Teflon sleeves, and provides improved baseline stability. Hassle free assembly and disassembly.

CARRY CASE

The optional carry case, complete with internal storage compartment, allows the titrator to be transported with the glassware already assembled and charged with reagents. Ready for immediate operation on arrival.

COULOMETRIC REAGENTS

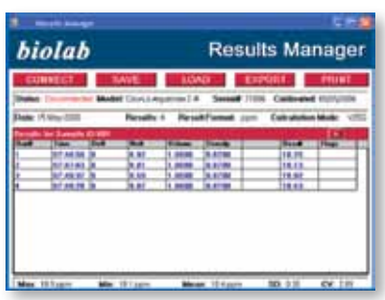
Cou-Lo Formula reagents offer optimum performance with Cou-Lo SU KF titrators. Our packaging concept has been based on advice from the HSE (Health & Safety Executive) to enable non laboratory personnel to work more safely. Cou-Lo Formula reagents are safer to use and safer to store. Cou-Lo Formula "A" anode reagent is suitable for most routine applications and is especially useful for water content determination of oil samples, e.g. transformer oils, crude oils, etc.

The anode reagent is supplied in "single shot" bottles of 100 ml, no volume measurement or mixing with other solvents is required. Cathode reagent, Formula "C", is supplied in "single shot" 5 ml ampoules which have "safety snappers" pre-fitted thereby reducing risk to the operator.

Each pack contains 8 x 100 ml bottles of anode reagent plus 8 x 5 ml ampoules of cathode reagent. Weighing only 3 kilo, the total pack volume is less than one liter so they can be shipped as limited quantity.

RESULTS MANAGER

This is a windows application that allows you to view and print sets of results created by the Cou-Lo SU KF Moisture Meter. It can download results directly from the titrator through a serial port connection, or open result files previously saved to disk. The Results Manager package contains all necessary cables, connections, installation cd and user manual. For those who need to use the titrator outside of the laboratory and do not have a PC or laptop with them; our removable flash drive (memory stick) will store all results. This flash drive can then be connected to a PC and results downloaded through Results Manager when returning to the laboratory. The Results Manager Software is supplied as a standard item included with the Cou-Lo SU KF.

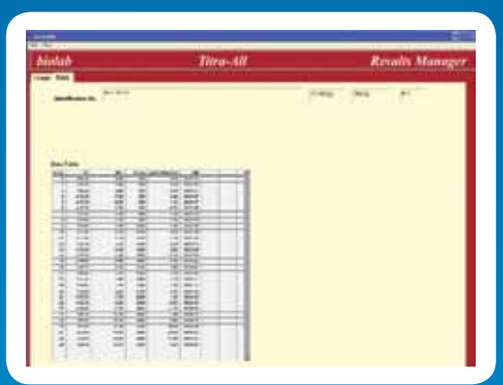


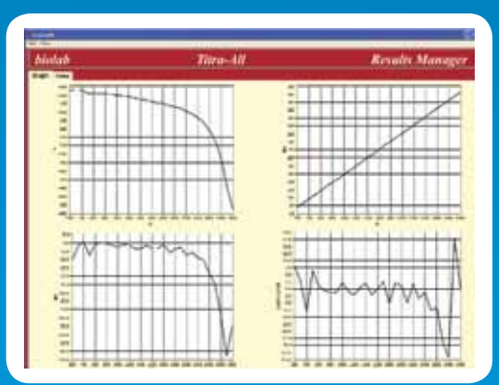
TAN / TBN Analysis
Titra - All

Areas of Applications

The Titra-All titrator is used for the analysis of:

- TAN (Total Acid Number)
- TBN (Total Base Number)
- Mercaptan Sulphur
- Analysis of petroleum products, lubricants and transformer insulating oils.





User selectable report formats. Titration analysis reports, method parameters, data table, titration curves, etc. Full reprocessing and statistical analysis of run data including first and second derivative graphical report.

The Titra - All titration system conforms to ASTM D664, D2896, D4739, D3227.
Working procedure:

- Choose method of analysis from menu.
- Calibrate the system according to chosen method.
- Blank determination for the titration solvent.
- Carry out Analysis of sample.
- Obtain direct readout of sample result.
- Post run analysis of data, result storage and printing.

Titra - All Titration System Features and Benefits

- User friendly auto titration system.
- User selectable End Point mode.
- Compliant to ASTM methods for TAN/TBN analysis of oil samples.
- Mercaptan sulphur titration method as standard.
- Interchangeable burette assemblies with intelligent volume recognition system.
- Vortex mixing system for vigorous and homogeneous stirring of viscous samples.
- Alphanumeric entry of all method parameters and sample data that ensures GLP compliance.
- Pre-programmed ASTM methods for easy operation.
- Two tier password protection, Administrator and User for method editing.
- User selectable report formats - Titration analysis reports, method parameters, data table, titration curves, etc.
- Full reprocessing and statistical analysis of run data including first and second derivative graphical report.
- Balance interface for weight data transfer.
- Data download to PC.
- Full printout facility for titration report, analysis graph and derivative calculation.

Keypad

Simple, easy to use keypad with function guide display. Alphanumeric entry of Sample Name, Titrant Name, Identification Number, Date and Time for Authentication, Customer Name and Instrument Serial Number on report printouts for GLP compliance.

TECHNICAL SPECIFICATIONS

Principle	:	Volume determination by equivalence point or end point
Control	:	Microcontroller based
mV range	:	± 3200
Accuracy	:	± 0.1 mV
Amplifier Impedance	:	> 10 12 ohms
Burette Resolution	:	1/5000 for 5 ml, 1/10000 for 10 ml and 1/5000 for 25 ml.
Filling Time	:	< 20 seconds
Keyboard keys.	:	Alphanumeric splashproof polyester soft
Display	:	40 x 2 backlit LCD
Titration Head	:	Manual stand with swivelling arm
Stirrer System	:	Microcontroller based variable speed, high torque vortex mixer.
Cut-off Criteria	:	Choice of Volume or End Point
Applications	:	Pre-programmed ASTM methods.
Report Format	:	Multi choice including method parameters, titration graph and 1st / 2nd derivatives.
Printer Connection	:	Paralel port.
Balance Connection	:	Serial interface & RS232C
Power	:	90-264 VAC - 47-63 Hz.

Burette System

Interchangeable burette assembly with intelligent volume recognition system. Simply remove the retaining screw, slide out the burette assembly and replace with different volume or titrant.
Easy to follow screen prompts.

Titration Vessel

Complete with vortex mixing burette for vigorous and homogeneous stirring of viscous samples. Chemically inert glass stirrer paddle. The vortex mixer is located next to the electrode so that the whole assembly can be swung away from the titration unit for easy rinsing and cleaning.

Electrode System

A range of specially manufactured electrodes designed for optimum performance and excellent results.

Flash Point Tester

Flash Point testers are the portable flash point testers, and combines all of the field proven advantages of the Flash Point tester line with a new convenient touch-screen design.

Avaiblable Methods

- Comforms to ASTM D6450 & D7094
- Excellent correlation to ASTM D93, D56, ISO 2719, ISO 13736, IP 170
- Excellent correlation to ISO 3679 & 3680
- Approved by US D.O.T, RCRA, NAVY, NATO
- Dilution Flash Point Testing
- Go / No Go Flash Point Testing
- Fast screening methods

Features

Advanced Flash Point Methods

Measurements are performed according to the safest Flash Point methods ASTM D6450 and D7094. The results are rated equivalent to ASTM D93/ISO 2719 Pensky Martens Method and are in excellent correlation with the standards ASTM D56, ISO 2719, ISO 13736, IP 170. Also available are methods for simulation of ISO 3679 and ISO 3680 testing, fuel dilution measurement for used oil analysis and fast screening programs.

OFFICIAL ASTM FLASHPOINT COMMITTEE STATEMENT
"There is no statistically significant bias observed between ASTM D7094 and ASTM D93 Procedure A."

Unique Combustion Analysis

Sometimes samples contain small concentrations of flammable compounds, which do not show a definite Flash Point. Flash Point tester detects even very small flames and graphically visualizes the presence of contaminations in those samples.

Extended Temperature Range

The possibility of external cooling for the Flash Point tester allows to cover a wide temperature range from 0 to 400°C. The range of all Flash Point tester is optimized to maximize the life time of Peltier temperature control.

Automatic ignition cleaning program

This method automatically removes tenacious residuals from the ignition system.

Maximum Safety

Only 1-2 ml of sample are required for testing the Flash Point in a continuously closed cup-without an open flame!

Ease of Use

Flash Point tester menu navigation is intuitive, no training is required for testing flash point, hassle free communication with USB, LAN, LIMS and PC is assured. In addition the analyzer allows to enable remote control and user rights management.

Flexibility for all applications

Almost any Flash Point method within varying environmental conditions can be simulated by controlling parameters like the heat rate, ignition energy and atmospheric oxygen.

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Features

- Intuitive Menu Navigation on Large Color Touch-Screen
- Automatic ignition cleaning program
- Runs on Microsoft® Windows® software
- Full network, PC and LIMS integration via LAN
- Unlimited number of methods and results
- Unique combustion analysis
- User Rights Management (GLP)
- Extended FLPH temperature range (0-400°C with external cooling)
- USB printer support
- USB data transfer

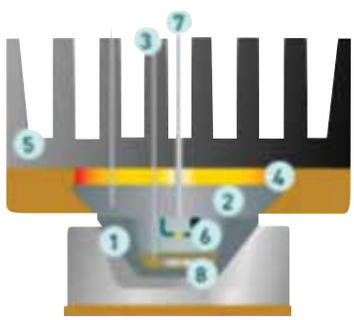
Flash Point Tester Line

- Approved by US D.O.T, RCRA, NAVY, NATO
- Approved for various ASTM specifications for fuels and oils
- World wide market leader for the flavors and fragrance industry
- Automatic Stand-Alone Operation
- Easy to Use, Easy to Clean
- Portable for Field Use
- Maximum Safety
- No Open Flame
- 1-2 ml Sample Size
- Fast and Accurate

TECHNICAL SPECIFICATIONS

Temperature Range	:	FLP: 0 to 200°C (32 to 390°F) FLPH: 0 to 400°C (32 to 750°F)
Temperature Stability	:	+/- 0.1°C (0.18°F)
Sample Volume	:	1 ml (ASTM D6450) or 2 ml (ASTM D7094)
Safest Technology Closed	:	Electric Arc Ignition Continuously Cup Technology, No open flame, No hazardous vapors, Flash detection by built-in pressure sensor
Fast Sample Throughput	:	10 samples per hour
Interfaces	:	3xUSB, 1xLAN, 2xPS/2, 1xVGA
Power Supply	:	100/110/230 V AC, 50/60 Hz, 150 W (optional car adapter for field use)
Dimensions (WxHxD)	:	253 x 368 x 277 mm
Weight	:	12 kg (26 lb)

Principle



An aluminum cup (1) with a capacity of 7 ml and containing 2 mL of sample is resting in the sample cup holder. For the test, the sample cup is lifted to the temperature controlled oven (2), forming the test chamber with a metal to metal seal. A thermo-couple (3) is immersed into the sample to measure the temperature. The temperature of the oven is controlled by Peltier elements (4) and an air cooled heat sink (5). The vapor is ignited by a high voltage arc (6) inside the test chamber. At the Flash Point, the pressure inside the sealed measuring chamber is increased significantly, which is detected by abuiltin pressure transducer (7). A rotating magnet and a small magnet (8) inside the sample cup provide stirring.

Total Sulfur Analyzer

Areas of Applications

- Complies with ASTM D7039 and ISO 20884.
- Total sulfur analysis from ultra low sulfur fuels up to crude.
- For electrical power generation plants, refinery labs, pipeline terminals, onboard use, additive plants, testing vans and inspection laboratories.

Features

- Fits on any bench and compatible for use in mobile labs/vans.
- Dimensions: 33 cm (h) x 30 cm (w) x 23 cm (d), 15 kg
- Easy to use as in lab and fully portable
- Utility: Standard wall power: 200-240 VAC.
- No need for gasses, no high temp operating conditions.
- LOD: down to 0.6 ppm (at measurement time: 900 s.)
- Dynamic Range: up to 10%.
- User Interface: Touch Screen.
- Ready to use pre-assembled sample cups for enhanced precision, operator ease-of-use and increased productivity.
- User programmable measurement time: 30-900 s.
- One calibration curve will run both diesel and gasoline.
- Extremely low maintenance: No conversion gasses, heating elements, quartz tubes or columns.
- Robust polyamide windows for easy cleaning.
- 15 W air-cooled excitation tube.

Plug-It-In & Measure. Results with One Touch. Unrivaled Precision.

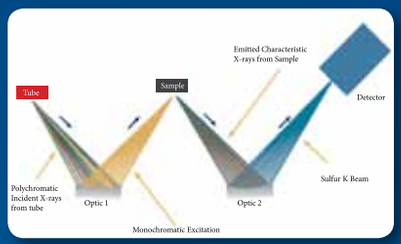
The Sindie OTG is the only PORTABLE sulfur analyzer and provides reliable quality results from ULSD (Ultra Low Sulfur Diesel) and gasoline to marine fuels and crudes. The analyzer is suitable for operating in-the-field, onboard marine environments and in laboratories. The analyzer uses Monochromatic WD XRF per ASTM D7039 and is compliant with ISO 20884.

Analysis on demand, when and where you need it.

Ready To Use Sample Cups

Total sulfur analysis from ultra low sulfur fuels up to crude. For electrical power generation plants, refinery labs, pipeline terminals, onboard use, additive plants, testing vans and inspection laboratories.

MWD XRF

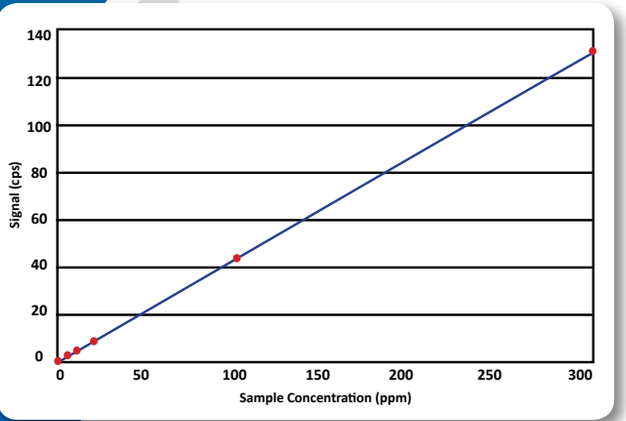


Monochromatic Wavelength Dispersive X-Ray Fluorescence (MWD XRF) utilizes state-of-the art focusing and mono-chromating optics to increase excitation intensity and dramatically improve signal to background over high power traditional WD XRF instruments.This enables significantly improved detection limits and precision and a reduced sensitivity to matrix effects. A monochromatic and focused primary beam excites the sample and secondary characteristic fluorescence x-rays are emitted from the sample. A second monochromating optic selects the sulfur characteristic x-rays and directs these x-rays to the detector. MWD XRF is a direct measurement technique and does not require consumable gasses or sample conversion.

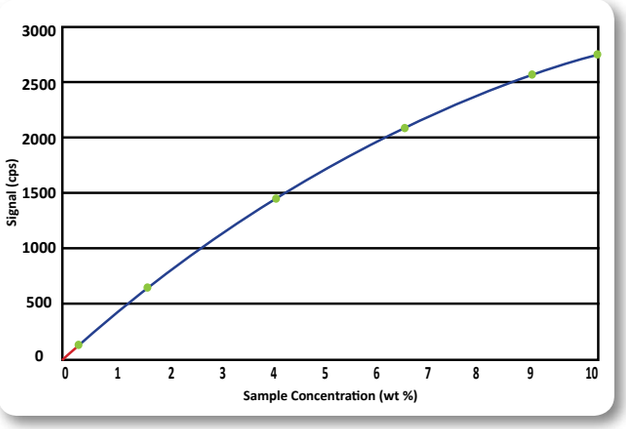
TECHNICAL SPECIFICATIONS

Test Method	:	ASTM D7039 and ISO 20884.
Sample Introductions	:	Maximum sample cup volume: 1 ml.
Ambient Temperature Requirements	:	5-40° C (40-104° F)
Dynamic Range	:	Up to 10% (wt.)
Measurement	:	30-900 s
Dimensions	:	33 cm (w) x 30 cm (d) x 23 cm (h)
Power	:	100-120 VAC, 47-63 HZ at 6.0 Amps/ 200-240 VAC, 47-63 HZ at 6.0 Amps
Other Utilities	:	None

Low Range Calibration



XR Calibration Curve



Precision

Typical repeatability (r) and reproducibility (R) values in diesel fuel, at 95% confidence. 900 s measurement time.

Sulfur Concentration (ppm)	r	R
4	0.4	1.0
8	0.7	1.2
15	0.9	1.7
100	3	6
500	6	12

Cloud & Pour Point & CFPP Testing of Petroleum Products

- Conform to ASTM D97, D2500, D5853, D6371, D6422, IP 309, ISO 3015, ISO 3016
- Digital Indicating, 0.1°C Resolution Temperature
- Wide range of available models
- Controller for Each Bath
- Liquid bath models
- Dry bath models

A wide range of models are available with working temperature ranges from +48° to -69°C. Each multi-bath unit conforms to ASTM D97 Pour Point and ASTM D2500 Cloud Point test methods and related methods. Each stainless steel liquid bath has its own digital indicating PID temperature controller with 0.1°C resolution, providing temperature stability of ±1.5°C. The baths of select models are agitated for improved temperature stability (±0.5°C) and uniformity and are, therefore, also suitable for ASTM D6371 (or IP309) Cold Filter Plugging Point test with the addition of the CFPP kit. Each bath comes equipped with 4 metal test jackets, 4 cork rings, 4 O-rings, and 4 cork stoppers for the thermometer (test tube is available separately). All units are mechanically refrigerated using ozone friendly non-CFC and non-HCFC refrigerants.

Model FIEN with two test positions is a portable, the most popular model used for quick testing procedures with unique cloud and pour point bath, not using any liquid as the cooling medium. It has the ability to very rapidly (less than 2 minutes) change the metal cup temperature to the next lower temperature. This allows one bath to perform the pour and cloud point as well as CFPP tests without the need to move the test tube to the next lowest bath temperature. Each cup has its own digital temperature controller and their temperature may be set independently. Lowest bath temperature is -33°C.

Model 3H3N is the most popular and versatile 3 bath bench model is the “work horse” of the industry. The baths are factory preset at 0°, -18°, and -33°C. Each bath has 4 test sample capacity.

Model 4H4N is also a popular caster mounted, floor model with 4 baths factory preset at 0°, -18°, -33°, and -51°C. Each bath is mechanically agitated for improved bath temperature uniformity and control. Each bath has 4 test sample capacity.

Particle Counter, Particle Shape Classifier and Dynamic Viscometer

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"The LNF uses laser imaging techniques and advanced image processing software to identify the type, rate of production and severity of mechanical faults by measuring the size distribution, rate of progression and shape features of wear debris in lubricating fluids."

Automatic Alarms Using Dynramic Equilibrium

Features

- Provides ISO Code 4406 (1999) for particles >4, >6 and >14 µm.
- Algorithms to perform shape analysis, wear particle identification and machine condition assessment.
- Determination of Dynamic (Absolute) Viscosity reported in cP for ISO 15 to ISO 320 grade oils at 40°C.
- Large particles are classed by a neural network as cutting, fatigue, severe sliding, nonmetallic, free water droplets or fibers.
- Provides image maps of all particles greater than 20 µm.
- Can handle particle concentrations over 5,000,000 particles/ml.
- Automatic adjustment for fluid darkness. Sees through black diesel lubricating oils.
- Measures soot content in used diesel engine lubricants.
- Can handle fluid viscosities up to 320 ISO grade without dilution.
- Includes built-in data-base for machine condition trending.
- Data outputs include particle type identification, image maps, size trends and NAS, NAVAIR and ISO cleanliness codes.
- Magnification is set at factory.
- Recalibration is never required.

Areas of Applications

The LNF is the next generation of particle shape classifiers and particle counters features numerous enhancements including a much faster CCD camera, an ergonomic sipper design, improved maintain ability and the ability to measure viscosity.

Machine condition monitoring based on oil analysis has become an accepted practice in any well run maintenance management program. With knowledge of the wear metals and contaminants present in a lubricating system, it may be determined if that equipment is operating properly or if preventive maintenance is required. LNF combines the standard oil analysis techniques of particle counting, shape classification, and viscosity into a single analytical instrument. Lockheed Martin Tactical Defense Systems developed LNF in cooperation with the Naval Research Laboratory for the Office of Naval Research on its Accelerated Capabilities Initiative for Condition-Based Maintenance.

Particle Counter, Particle Shape Classifier and Dynamic Viscometer

Operation

The LNF is an automated microscope that captures the silhouette image of particles in oil flowing through a 100 µm thick flow cell. Using magnifying optics and a powerful pulsed laser, an image of the sample is captured by a video camera and stored in computer memory. The objects are then analyzed for maximum size and several shape characteristics which are used to classify particles into mechanical wear classes. Each laser pulse provides a single image frame to be analyzed, and the results of thousands of frames are combined for the analysis of each sample.

Particle Shape Classifier

Particle shape classification is performed with an artificial neural network that was developed specifically for the LNF system. Shape features were chosen to give optimal distinction between the assigned classes of cutting, fatigue, severe sliding, nonmetallic, free water droplets and fibers. The neural network was trained on an extensive library of particles that were classified by human experts using ferrography and microscopy.

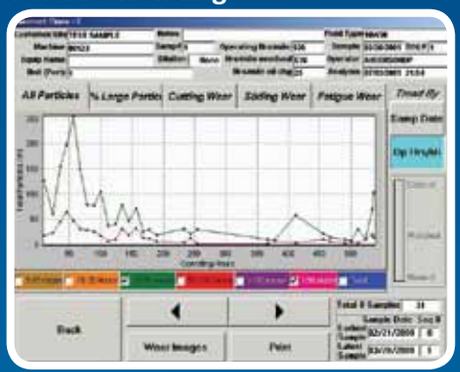
Particle Counter

The LNF stores thousands of images to obtain good counting statistics. Although the actual shape of each particle is captured, the equivalent circular diameter of each particle, from 4 to >100 µm, is calculated to provide NAS, NAVAIR, and ISO cleanliness codes. The LNF accurately measures much higher particle concentrations than conventional particle counters because it views many particles simultaneously within an area of 1600 x 1200 µm rather than measuring the light blockage caused by one particle at a time. It is not necessary to recalibrate the LNF because, like a microscope, once the magnification is set at the factory, it remains fixed. NIST Standard Reference Material 2806 (Medium Test Dust in Hydraulic Fluid) is measured as a final QC procedure at the factory and may be used thereafter as a check fluid. Air bubbles (> 20 µm) are recognized and eliminated from the count and water droplets (> 20 µm) are recognized and quantified. The laser is powerful enough to process sooted (black) oils.

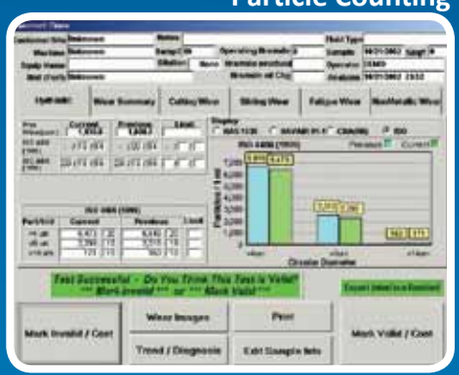
Viscosity

When selected, the LNF provides viscosity of the sample at the same time as it performs particle count and particle shape classification. Dynamic Viscosity measurements are reported in Centipoise (cP) at 40°C. Typical processing time is 2-6 minutes per sample for a viscosity range of ISO 15 to 320 grade. The viscosity capability also does not require calibration, but the LNF performance can be periodically verified with a certified viscosity standard.

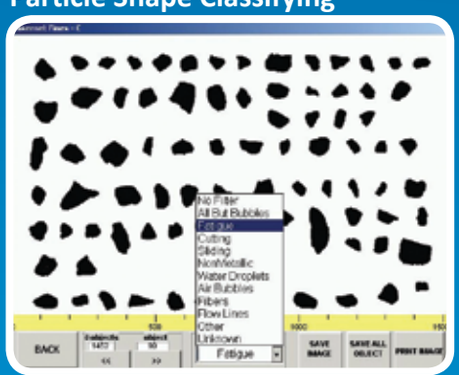
Particle Trending



Particle Counting



Particle Shape Classifying



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AUTOMATIC SAMPLE PROCESSOR (ASP)

An optional ASP is available that automatically runs 24 samples. Before processing each sample, a special stirrer resuspends particles without introducing air bubbles. The stirrer and sipper are rinsed after each sample to prevent cross contamination. The ASP can be added later without the need for any retrofitting.

TECHNICAL SPECIFICATIONS

Applications	:	Mineral and synthetic lubricants including gear, engine, hydraulic, turbine and distillate fuels
Output	:	Particle Count ISO 4406, NAS 1638, NAVAIR 01-1A-17, SAE AS 4059, GOST, ASTM D6786, HAL User Defined; Viscosity per ASTM (DW); Free Water % or ppm (mg/kg); Soot wt. %; Particle shape per LNF Method
Methodology	:	ASTM D7596
Standard Analytical Range	:	Viscosity between 15 to 320 cSt 40°C; Particles greater than 4 µm to 100 µm
Accuracy	:	Varies by Method
Repeatability	:	Varies by Method
Test Temperature Control	:	± .1°C (Viscosity Feature)
Calibration	:	Not Required
Sample Volume	:	30 mL minimum
Solvents/Reagents	:	Electron Solvent; Odorless Kerosene
Ambient Operating Temperature	:	25°C to 35°C
Relative Humidity	:	10% to 80% r.h. non-condensing
Ambient Altitude	:	up to 5,000 meters (16,404 feet)
Software/Operating System	:	Windows®7, 2000, XP, Vista-Based
Display	:	External
Data Storage	:	External
Data Transfer	:	USB
Security	:	Password Protected
Data Entry	:	External
Power	:	AC 110/240 V, 50/60 Hz, 10 Watts

FTIR Oil Analyzer

Features

- Instrument and software specifically designed for the analysis of inservice oil.
- Complies with ASTM E2412 Standard
- Practice for Condition Monitoring of Used Lubricants by Trend Analysis Using Fourier Transform Infrared (FT-IR) Spectroscopy.
- Quantitative TAN and TBN analyses (in mgKOH/g).
- Patent-pending flip-top sample cell eliminates need for solvents and simplifies cleaning.
- Ability to analyze fluids with a wide range of viscosities, including greases.
- Fixed interferometer, does not require software or manual alignment.
- Exceptional stability and reliability in harsh operating environments.
- Completely sealed and desiccated to prevent humidity interferences.
- Bench-top, requires little counter space.

The FTIR Oil Analyzer

The FTIR Oil Analyzer is specifically designed for the molecular analysis of lubricating oil to determine oil degradation and contamination. It was developed and optimized for predictive maintenance programs according to JOAP and DIN standards for the rapid determination of oxidation, nitration, sulfation, water, coolant, fuel dilution, soot and wear additive depletion in used lubricating oils. It also provides quantitative TBN analysis (in mgKOH/g) for mineral based engine oils and TAN analysis (in mgKOH/g) for polyol ester based synthetic turbine fluids.

The FTIR is a bench-top instrument that requires little counter space for operation. It uses an innovative patent pending flip top cell to introduce and analyze the sample.

Sample introduction is thus extremely simple, reliable and eliminates the need for a peristaltic pump and solvents. The system is easy to use and requires little training for operation since it is optimized for one application: in-service oil analysis.

When coupled with an optional autosampler, the FTIR Oil Analyzer is ideal for condition monitoring laboratories with large sample loads. For automatic operation, the FTIR Oil Analyzer is equipped with a zinc selenide wedge transmission flow cell that improves performance by minimizing fringing associated with normal cells. The transmission cell has high infrared throughput, is optimized for used oil analysis and is easy to clean. The cell assembly is mounted in a prealigned base plate for fast and reproducible exchange.

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"The FTIR was developed and optimized for predictive maintenance programs according to JOAP and ASTM standards for the rapid determination of oxidation, nitration, sulfation, water, coolant, fuel dilution, soot and wear additive depletion in used oils."

TECHNICAL SPECIFICATIONS

Spectral Range	:	**Manual System** *Standard*: ZnSe Flip-top cell, windows, beamsplitter (Range: 6,000-500 cm^{-1}) *Optional* : ZnSe Flip-top cell, KBr windows, beamsplitter (Range: 7,000-500 cm^{-1}) **Automatic System (optional)** *Standard*: ZnSe wedged transmission cell, windows, beamsplitter (Range: 6,000-500 cm^{-1}) *Optional* : KBr wedged transmission cell, windows, beamsplitter (Range: 7,500-375 cm^{-1})
Frequency Accuracy	:	Better than 2 cm^{-1}, optional beter than 0.9 cm^{-1}
Signal to Noise	:	1 Min:> 30,000:1 (1.5 x 10-5 AU noise) peak-to-peak, 4 cm^{-1} resolution
Interferometer	:	ROCKSOLID™, permanently aligned, high stability
Detector	:	DTGS
Dimensions (WxDxH)	:	22 x 30 x 12.5 cm
Weight	:	7 Kg
Power	:	100 - 240 VAC, 50 - 60 Hz (max 1.3 A)
Environmental Conditions	:	Operational temperature range: 18°C - 35°C (64 -95°F)
Temperature Variation	:	1 °C/h and max 2 °C/day Humidity (non-condensing): less than 80 % (relative humidity) Installation site : in a closed room Installation over voltage category: II Ambient Altitude : 2,000 meters (6,562 feet)
Cleaning Solvent	:	None with ZnSe Flip Top Cell, Pentane with Wedge Transmission Cell
Computer Interface	:	Ethernet Connection

FTIR Oil Analyzer

The FTIR Spectrometer is a complete in-service oil analysis system. It includes:

- Software specialized for in-service oil analysis. Additional capabilities available.
- Permanently aligned, high sample throughput interferometer.
- Software that continuously monitors all optical components and accessories.
- Fixed interferometer which avoids the need for time consuming and complex alignment.
- Internal Validation Unit (IVU) with calibration standards to systematically validate the system.
- Infrared source is easily replaced without special training.
- Computer and monitor, Windows® XP PRO operating system.
- Ethernet connection for spectrometer operation from a PC, laptop or network.
- Optional QUANT quantitative analysis software uses a full spectrum of multivariate analysis method for setting up models and provides a wide range of pre-processing and validation options and offers an automatic routine for the optimization of calibration methods.

1- Remove Cell

2- Open Cell

3- Clean Cell

4- Place drop of Oil on Cell

5- Close Cell

6- Replace Cell in Spectrometer and Measure Sample

Other Products

Gasoline & Diesel Analysers

Refractometers

Oxidation, Corrosion & Rust Testing Instruments

FluidScan Portable Lubricant Conditation Monitor

Automatic Distillation Tester

Foam Testing Instruments

Turn Key Lab Solutions

Mobile Lab

Vapor Pressure Tester

Detailed product catalog is available on request

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